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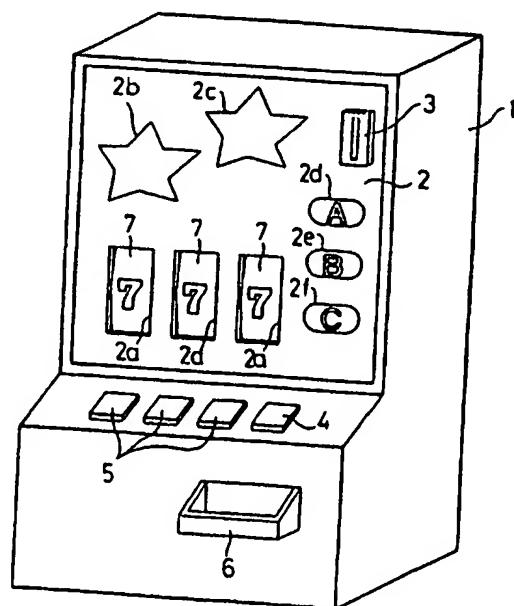
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(54) Slot machine

(57) The present invention provides a slot machine, in which patterns, numbers or the like on the decorative panel can be designed without restriction and can be illuminated with no fluctuation in brightness and no damage to the internal parts by the heat generation. An EL element (9 Figure 2) is adhered to the reverse side of the decorative panel 2 so as to illuminate the patterns 2b, 2c, 2d, 2e and 2f by using the EL element (9) as the backlight. The EL element (9) is made up of a luminescent layer (9c) and an insulating layer (9d) between a transparent electrode (9b) and a back electrode (9e).

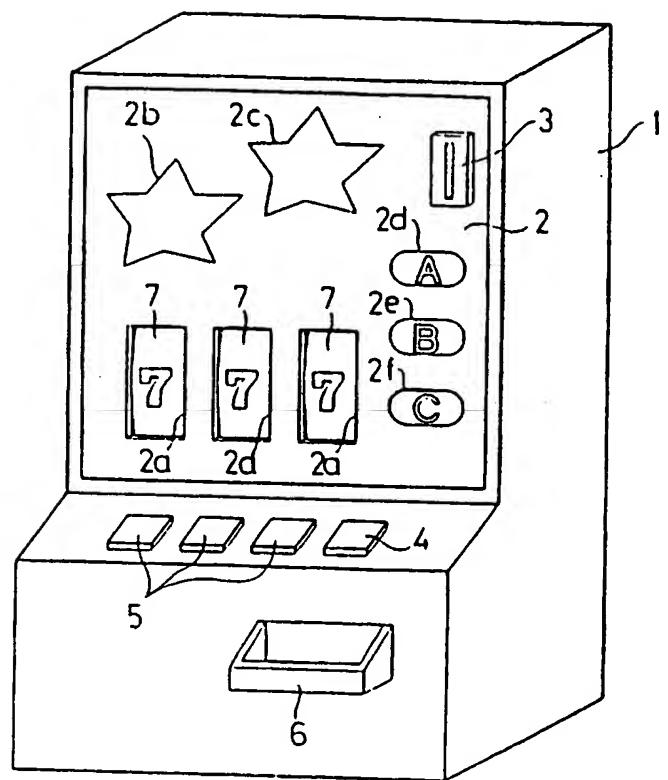
FIG. 1



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FIG. 1



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FIG. 3

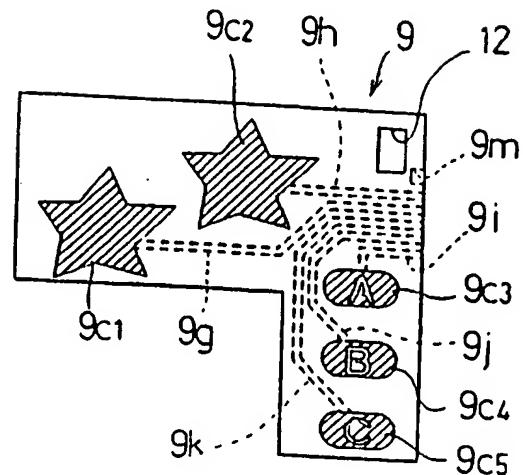
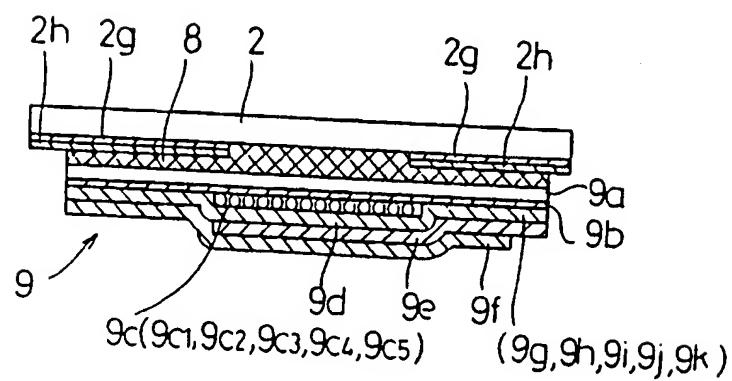


FIG. 2



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FIG. 4

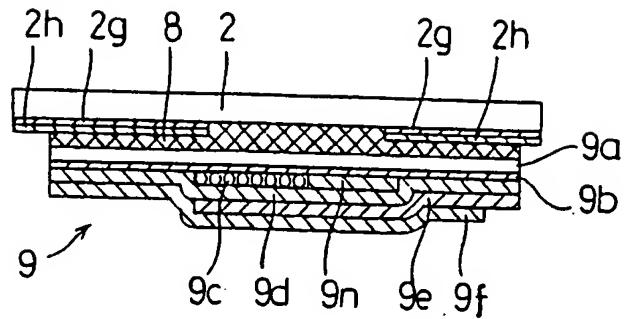
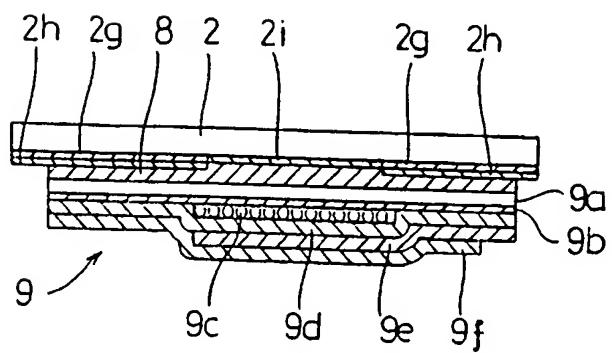
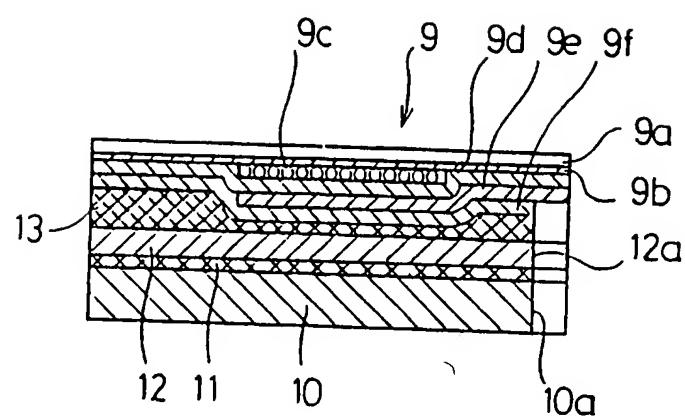


FIG. 5



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FIG. 6



SLOT MACHINE

This invention relates to a slot machine.

There are slot machines provided with a plurality of drums on which desired designs or numbers are drawn and which are rotatable by operating a lever or a button after insertion of a token, coin or the like. A certain number of tokens are given as premiums or rewards for specified combinations of the designs or numbers when the rotation is stopped, and so the slot machine provides not only satisfaction to players in obtaining rewards, but also visual enjoyment of the designs. A decorative panel for displaying patterns or letters is independently mounted on an outer periphery of a display window for designs and numbers shown on the plurality of drums, and lamps are mounted behind the decorative panel. The patterns or letters on the decorative panel illuminate and change color by means of lamps lit as a backlight, when the specified combinations of designs and numbers on the plurality of drums are accomplished, which creates attractive or eye-catching visual effects.

However, in the known construction of slot machines, a large area is required to accommodate the lamps, and the positions and spacing of the illuminating spots of the decorative panel are restricted, thus imposing a limitation on the variety of the patterns or numbers on the decorative panel. In addition, the brightness of the illumination of the patterns or letters on the decorative panel fluctuates in brightness due to the construction of the lamp. Furthermore the interior parts are adversely affected by the heating up of the lamps during illumination of the patterns or letters on the decorative panel.

The present invention seeks to provide a slot machine, in which patterns, letters or the like on the decorative panel can be designed without restriction

and can be illuminated with minimal or reduced fluctuation in brightness and no damage to the internal parts by heat generation.

5 According to the invention, there is provided a slot machine having a decorative panel portion in which an electroluminescent element provides at least a part of a backlight for the decorative panel portion.

10 In a preferred embodiment an electroluminescent element (hereinafter referred to as "EL element") has a luminescent layer and an insulating layer between a transparent electrode and a back electrode.

It is desirable for the EL element to selectively illuminate a plurality of portions.

15 For a better understanding of the present invention, and to show how the invention may be brought into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

20 Figure 1 is a perspective view showing an outline of the construction of a slot machine of this invention.

Figure 2 is a schematic view showing the structure of an EL element and a decorative panel.

Figure 3 is a plan view of the EL element.

25 Figure 4 is a schematic view of an example of a modification of the decorative panel of Figure 2.

Figure 5 is a schematic view of an example of a modification of the EL element of Figure 2.

30 Figure 6 is a schematic view of an example in which an EL element is utilized as at least a part of the decorative panel of Figure 2.

A slot machine according to one embodiment of this invention will now be described, with reference to the accompanying drawings.

35 As shown in Figure 1, the slot machine according to one embodiment of the invention has a decorative panel 2 made of transparent glass on the front side of

an exterior housing 1; a token or coin slot 3 passing through the decorative panel 2 from the rear side of it and projecting in front of the decorative panel 2 on the upper part of the decorative panel 2; an operating button 4; stop buttons 5; a payout tray 6; and several rotating drums 7 arranged behind the decorative panel 2. When tokens (not shown in the Figure) are inserted into the token slot 3 and the operating button 4 is pushed, the respective drums 7 rotate, and this rotation is stopped by the operation of the stop buttons 5. If specified combinations of the numbers on the drums occur, a certain number of tokens, as a prize, are ejected to the payout tray 6.

The decorative panel 2 has a plurality of apertures 2a corresponding to the setting positions of the drums 7, through which apertures 2a, numbers on each drum 7, can be clearly recognized. On the decorative panel 2, star-like patterns 2b, 2c and elongated circle patterns 2d, 2e, 2f, for example, are drawn around the apertures 2a. The patterns 2b, 2c, 2d, 2e, 2f admit light, and a background around these patterns intercepts light. That is to say, as shown in Figure 2, a light intercepting layer 2h is formed by printing on a colored layer 2g which is partly formed by printing on the back of the decorative panel 2, and thus the patterns 2b, 2c, 2d, 2e, 2f are defined by the printed layers 2g and 2h functioning as the background of the patterns 2b, 2c, 2d, 2e and 2f.

A printing ink for the light intercepting layer 2h is, by way of an example, composed of metal powder added into polyester resin or color pigment, for example black or white, added into polyester resin. However other suitable light intercepting layers are known to a person skilled in the art.

An EL element 9 is adhered to the reverse side of the decorative panel 2 through a transparent adhesive

sheet 8 so as to illuminate the patterns 2b, 2c, 2d, 2e and 2f by using the EL element 9 as the backlight. The EL element 9 is composed of a transparent electrode 9b made of indium tin oxide (ITO) vacuum deposited on a 5 transparent film 9a formed of polyethylene terephthalate (PET) or the like. A luminescent layer 9c, an insulating layer 9d and a back electrode 9e are subsequently laminated on the transparent electrode 9b, by screen printing, for example, and finally a 10 protective layer 9f is coated on the back electrode 9e. The luminescent layer 9c can be illuminated by applying an alternating current between the transparent electrode 9b and the back electrode 9e. A printing ink suitable for use as the luminescent layer 9c is formed 15 from a mixture, with agitation, of an electroluminescent material such as zinc sulphide doped with copper and a fluoropolymer binder. A printing ink suitable for use as the insulating layer 9d is formed from a mixture, with agitation, of barium titanate and 20 a fluoropolymer binder. A printing ink for the back electrode 9e is formed from a mixture of carbon powder and a polyester binder. The protecting layer 9f is formed by coating an insulator, such as a silicon resin, on to the back electrode 9e to cover and protect 25 the back electrode 9e. It will be apparent to a skilled person that other mixtures may be used to form the above layers, and the invention is not limited to those described above.

30 In the EL element 9, as shown in Figure 3, a plurality of luminescent layers 9c1, 9c2, 9c3, 9c4 and 9c5 (shown also in Figure 2) are formed corresponding to the plane features of the patterns 2b, 2c, 2d, 2e and 2f on the decorative panel 2, to superpose the 35 patterns 2b, 2c, 2d, 2e and 2f on each luminescent layer. On the luminescent layers 9c3, 9c4 and 9c5, the letter patterns [A], [B], [C] are formed by using a

printing ink containing a pigment, whose color is different from the base color, so as to illuminate not only the elongated circle patterns but also the letters [A], [B], [C]. Therefore, the patterns 2b, 2c, 2d, 2e and 2f on the decorative panel 2 are illuminated by virtue of the EL element 9 functioning as the backlight, and the letters [A], [B], [C] are also illuminated during the illuminating period of the patterns 2b, 2c, 2d, 2e and 2f. In Figure 3, the reference number 12 indicates the opening formed for the medal slot 3.

The shapes of the luminescent layers 9c1, 9c2, 9c3, 9c4 and 9c5 are constructed to be larger than those of corresponding patterns 2b, 2c, 2d, 2e and 2f, so that it is possible to superpose the luminescent layers 9c1, 9c2, 9c3, 9c4, 9c5 and the corresponding patterns 2b, 2c, 2d, 2e, 2f, and the patterns 2b, 2c, 2d, 2e, 2f are able to be correctly illuminated by the EL element 9 functioning as the backlight even if positioning of the decorative panel 2 relative to the EL element 9 is slightly offset.

Of the luminescent layers 9c1, 9c2, 9c3, 9c4 and 9c5, the layers 9c1 and 9c2 are always illuminated, but the layers 9c3, 9c4 and 9c5 are selectively illuminated when specified combinations of the numbers on the rotating drums 7 occur. That is to say, while the patterns 2b, 2c of the decorative panel 2 are continuously illuminated by the EL element 9 as the backlight, the patterns 2d, 2e, 2f of the decorative panel 2 are selectively illuminated by the EL element 9 as the backlight only when the specified combinations of the numbers on the rotating drums 7 occur.

In order to enable the luminescent layers 9c1 and 9c2 always to be illuminated and the layers 9c3, 9c4 and 9c5 to be illuminated selectively when the specified combinations of numbers of each rotating

drums 7 occur, the insulating layer 9d is formed so as to cover the full area of the transparent layer 9b including the luminescent layers 9c1, 9c2, 9c3, 9c4 and 9c5, and the back electrode 9e is formed on only part 5 of the insulating layer 9d, corresponding to the luminescent layers 9c1, 9c2, 9c3, 9c4 and 9c5 as shown in Figure 2. The insulating layer 9d has a portion 9m for exposing a part of the transparent electrode 9b. The portion 9m is formed, for example, by masking that 10 part of the transparent electrode 9b when the insulating layer 9d is formed by the screen printing. Electrode patterns 9g, 9h, 9i, 9j, 9k extending from the respective back electrodes 9e are formed on the insulating layer 9d so as to gather in the neighborhood 15 of the portion 9m. Adjacent the cut-off portion 9m, a connector (not shown) is mounted to be connected to the transparent electrode 9b exposed through the cut-off portion 9m and to the electrode patterns 9g, 9h, 9i, 9j, 9k. Through this connector, the transparent 20 electrode 9b and the electrode patterns 9g, 9h, 9i, 9j, 9k are connected to a drive circuit (not shown). The luminescent layers 9c1 and 9c2 illuminated by the drive circuit, and the luminescent layers 9c3, 9c4, 9c5 illuminated selectively by the specified combinations 25 of the numbers on the rotating drums 7, by controlling currents to be applied to the transparent electrode 9d and the electrode patterns 9f, 9h, 9i, 9j, 9k.

The protecting layer 9f is also formed on the electrode patterns 9g, 9h, 9i, 9j and 9k to expose the 30 terminal parts of the electrode patterns 9g, 9h, 9i, 9j and 9k, and the connector is linked to the electrode patterns 9g, 9h, 9i, 9j and 9k on the exposed portions of the electrode patterns 9g, 9h, 9i, 9j and 9k, as shown in Figure 2.

35 In the construction mentioned above, the patterns 2b, 2c on the decorative panel 2 are illuminated

continuously to utilize the EL element 9 as the
backlight. When the token or coin (not shown) is
inserted into the token slot 3 and the operating button
4 is pushed, the rotating drums 7 rotate. The rotation
5 of the drums 7 is stopped by pushing the stop button.
When the specified combinations of the numbers on the
drum 7 occurs, a certain number of tokens are ejected
to the payout tray 6. In accordance with the
combination, the patterns 2d, 2e, 2f on the decorative
10 panel 2 illuminate selectively and change color with
the EL element 9 as the backlight.

Accordingly, the patterns 2b, 2c, 2d, 2e, 2f on
the decorative panel 2 illuminate with the EL element 9
as the backlight, not only providing amusement of play
15 by obtaining tokens but also giving enjoyment by
watching the visual effects due to the change of
colors.

Since the EL element has a thin structure, it does
not require a large space such as the conventional
20 lamp. Therefore no restriction is placed on the
positions of illumination on the decorative panel 2 and
it is possible to illuminate the patterns 2b, 2c, 2d,
2e, 2f without restriction on the design, thus
enhancing the flexibility of the design on the
25 decorative panel 2. For example, even when the
patterns 2b, 2c are drawn on the corner of the
decorative panel 2, it is possible to illuminate
patterns 2b, 2c on the decorative panel 2 with the EL
element 9 as the backlight.

30 Also, since the structure of the EL element 9
allows its surface to be illuminated without brightness
fluctuation, the patterns 2b, 2c, 2d, 2e and 2f of the
decorative panel 2 may be illuminated without
fluctuation in brightness.

35 At the moment, since the EL element 9 does not
generate heat, it does not cause damage to the other

internal parts on the reverse side of the decorative panel 2 due to heat generation.

In the EL element 9, since the plurality of luminescent layers 9c1, 9c2, 9c3, 9c4, 9c5 are formed corresponding to the shapes of the patterns 2b, 2c, 2d, 2e and 2f on the decorative panel 2, and the layers 9c3, 9c4 and 9c5 are illuminated selectively according to the specified combinations of the numbers on the drums 7, a diversified change of the colors of the patterns 2d, 2e and 2f depending on the combinations of the numbers can be achieved, and thus the decorative function and the representative function of the decorative panel 2 can be enhanced.

In the construction mentioned above, the letters [A], [B] and [C] are patterned with the printing ink including the coloring pigments different from the color of the background on the luminescent layers 9c3, 9c4, 9c5, but as shown in Figure 4, there is a different way in which the luminescent layer 9c and the non-illuminating printing layer 9n are patterned on the transparent electrode 9b, to make the background of the letters [A], [B] and [C] to be non-illuminating. For example, while the luminescent layer 9c is patterned as the letter [A] on the transparent electrode 9b, the non-illuminating printing layer 9n may be patterned as the background of the letter [A] on the transparent electrode 9b.

In the construction mentioned above, the colored layer 2g is partly formed on the reverse side of the decorative panel 2 by printing and at the same time the light-intercepting layer 2h is formed on the colored layer 2g, and the representative patterns 2b, 2c, 2d, 2e, 2f utilize the printed parts of the colored layer 2g and the light-intercepting layer 2h as the background of the patterns 2b, 2c, 2d, 2e and 2f. However, as shown in Figure 5, the light transmissible

colored layer 2i may be formed on the non-printing parts of the colored layer 2g and the light-intercepting layer 2h, so as to represent the patterns 2b, 2c, 2d, 2e, 2f with the colored layer 2i.

5 In the above mentioned construction, the EL element 9 is adhered to the reverse side of the decorative panel 2 by using the transparent adhesive sheet 8, but another fixing methods, such as a double sided adhesive tape or clamping means, may be used to 10 adhere the EL element 9 to the reverse side of the decorative panel 2.

In the construction mentioned above, the EL element 9 is mounted as the backlight for the decorative panel 2, but the EL element may also be 15 mounted as the decorative panel itself or as a part of the decorative panel 2. For example, as shown in Figure 6, a piece of Kent paper 12 is adhered on the surface of a wooden base 10 with a water-soluble adhesive 11, and at the same time the EL element 9 is 20 adhered on the surface of the Kent paper 12 with the water-soluble adhesive 13. This structural part is attached on the upper-front side of the external frame 1, mounting the EL element 9 as the decorative panel 2. Cut-off portions 10a and 12a for exposing a part of the 25 respective electrode patterns 9g, 9h, 9i, 9j and 9k, are formed on the wooden base 10 and the Kent paper 12. The transparent electrode 9b and the electrode patterns 9g, 9h, 9i, 9j and 9k are connected to a connector (not shown) through these cut-off portions 10a and 12a.

30 Although a non-seal type of EL element 9 is used in the construction above, a seal type of EL element 9 may also be used for this purpose.

35 As explained above, with the slot machine according to this invention, the EL element having the luminescent layer and the insulating layer between the transparent electrode and the back electrode is mounted

as the backlight of the decorating panel or a part of the decorating panel, and so it is possible to illuminate the patterns or the numbers without restriction of design, with no fluctuation in 5 brightness and without damage to the internal parts by heat generation. Selective illumination of various portions on the EL element enables the device to change colors of the patterns or the numbers of the decorative panel in various ways, and thus the decorative and 10 representative functions of the decorative panel can be enhanced.

CLAIMS

1. A slot machine having a decorative panel portion in which an electroluminescent element provides a backlight for at least a part of the decorative panel portion.

5

2. A slot machine as claimed in claim 1, in which the electroluminescent element is formed as at least one part of the decorative panel.

10

3. A slot machine as claimed in claim 1 or 2, in which the electroluminescent element comprises a luminescent layer and an insulating layer between a transparent electrode and a back electrode.

15

4. A slot machine according to one of claims 1-3, in which said electroluminescent element is adapted to selectively illuminate a plurality of decorative panel portions.

5. A slot machine substantially as herein described with reference to the accompanying drawings.



The
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Office

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Application No: GB 9621760.9
Claims searched: 1 - 5

Examiner: Roger Casling
Date of search: 15 January 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): G5C(CAD,CAX,CEP,CFF)

Int CI (Ed.6): G09F

Other: Online:WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2230638 A (KAUMAGRAPH)	I
A	GB 2220291 A (JAMES)	I

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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